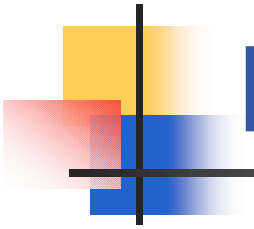
Enhancing high multiplicity events in pp collisions

- Motivations
- Trigger selections
- Results
- Summary, future plans

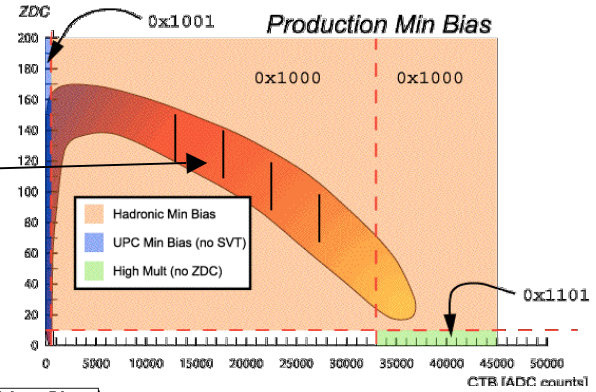


Motivations

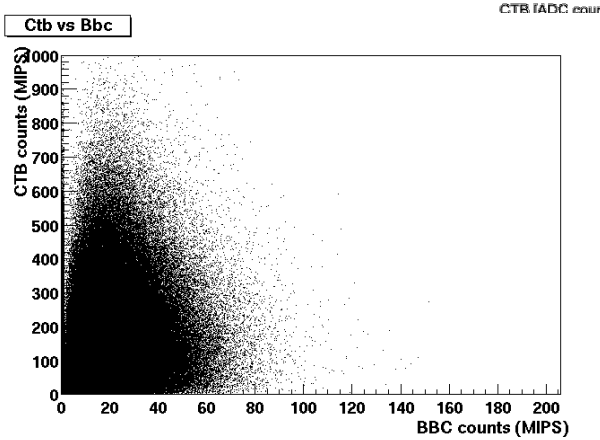
- If early thermalization and high energy density occurs in pp collisions, theory suggests QGP formation even in very small system.
- First evidence of deconfinement in ppbar collisions at 1.8 TeV Tevatron, Fermilab: T. Alexopoulos et. al. Phys.L. B. 528 (2002) 43-48.
- The observed high total multiplicity events are formed in an initially high energy density collision. Select these events.

Trigger selection

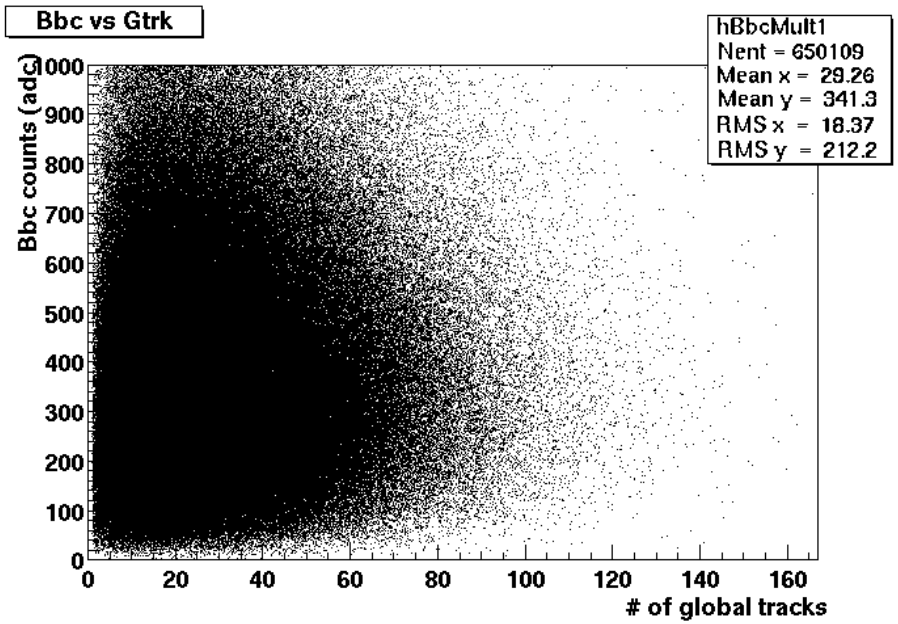
- In AuAu collisions ZDC, CTB, BBC provided event selection.

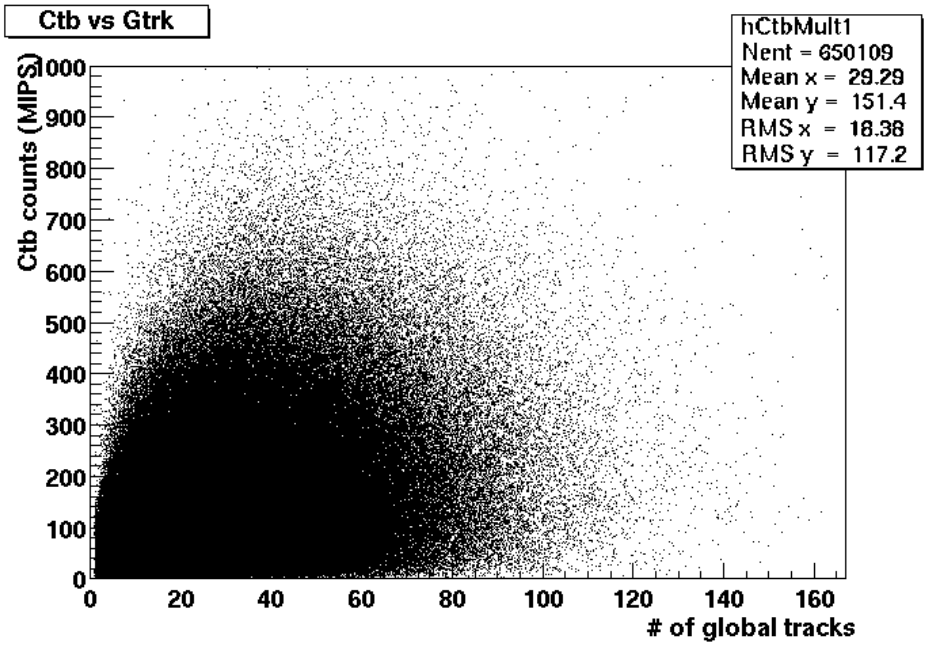


- In pp collisions the trigger detector responses are weakly correlated with respect to multiplicity.



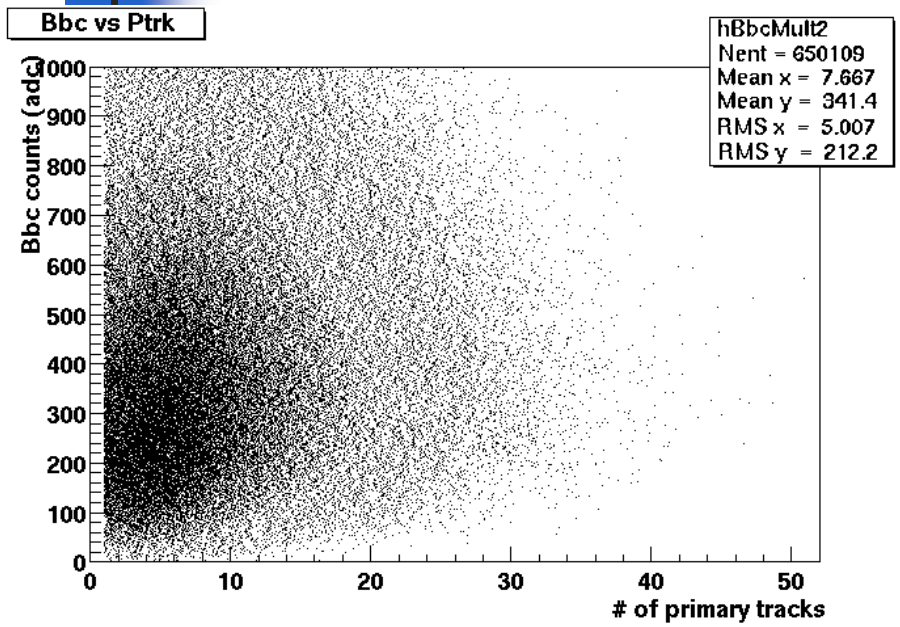
Detector responses

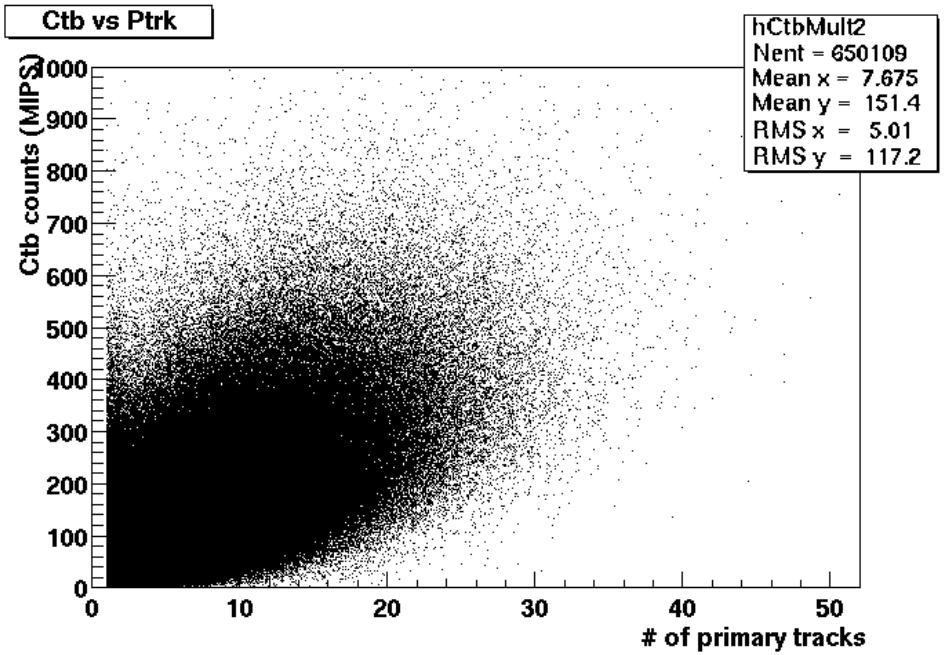




The correlation is weak.
One can try the primary tracks as well.

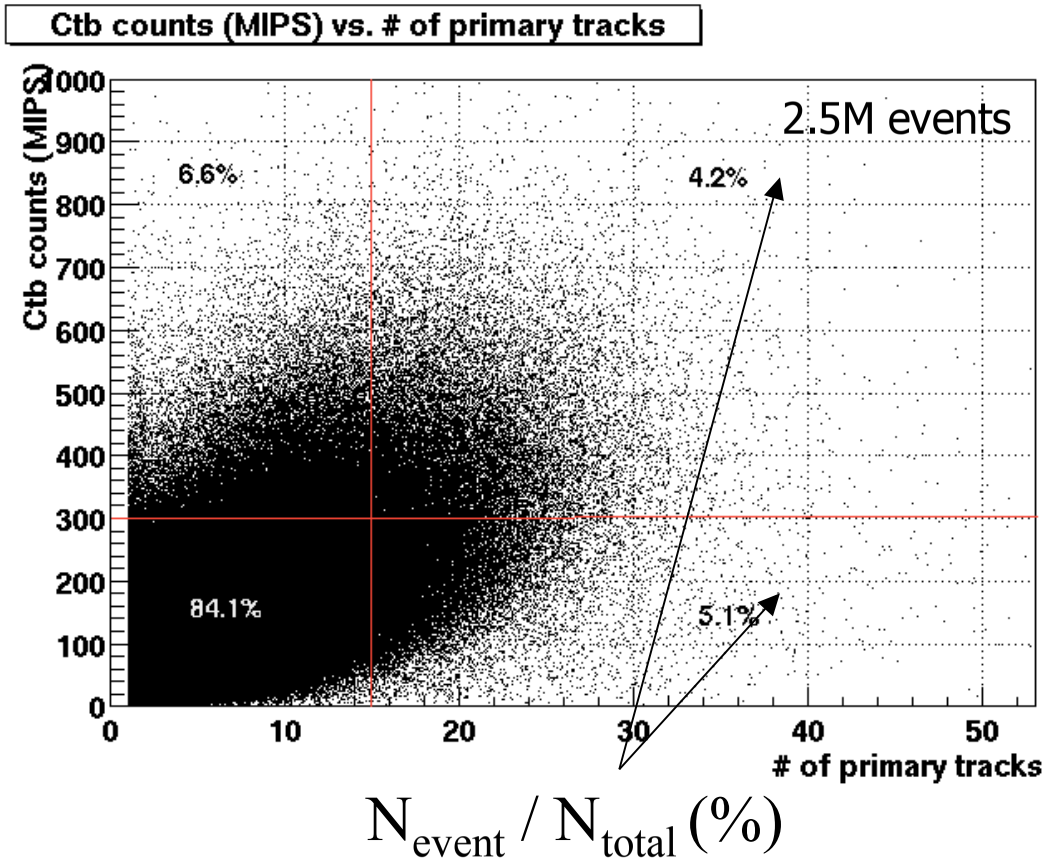
Detector responses 2.





The correlation is still weak. But, we can define a cut on CTB to enrich our data sample.

Data enrichment



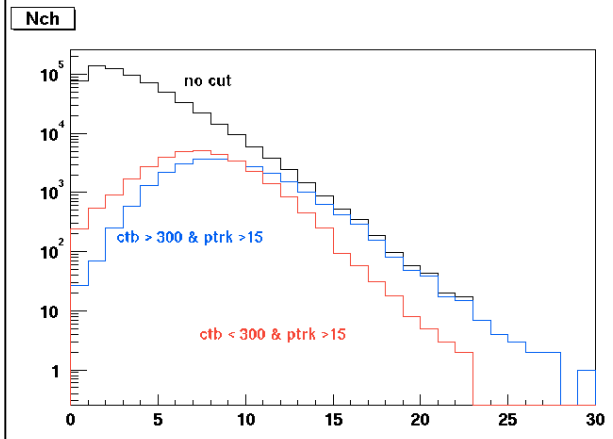
N_{event} / N_{total} (%)

Regions:

1	2
3	4

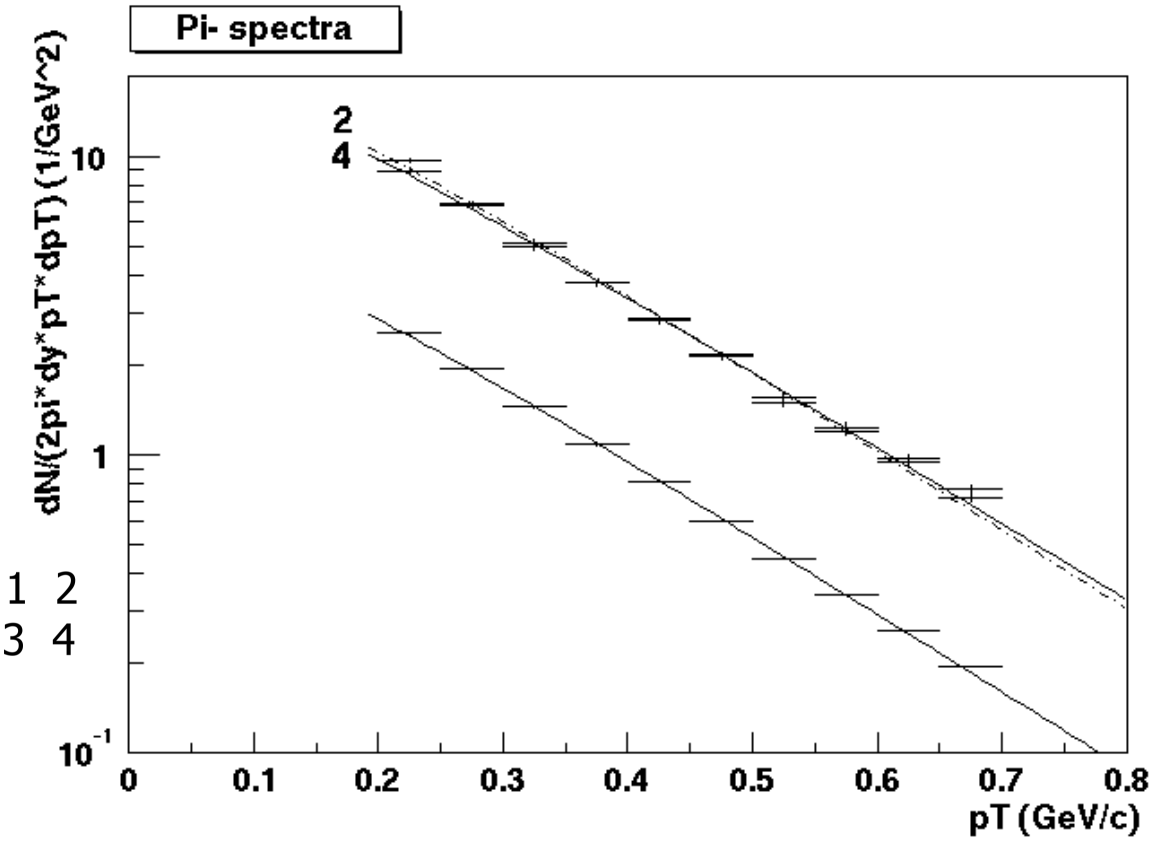
Nch, $|\eta| < 0.5$

<Nch>



2.9
8.9
7.8

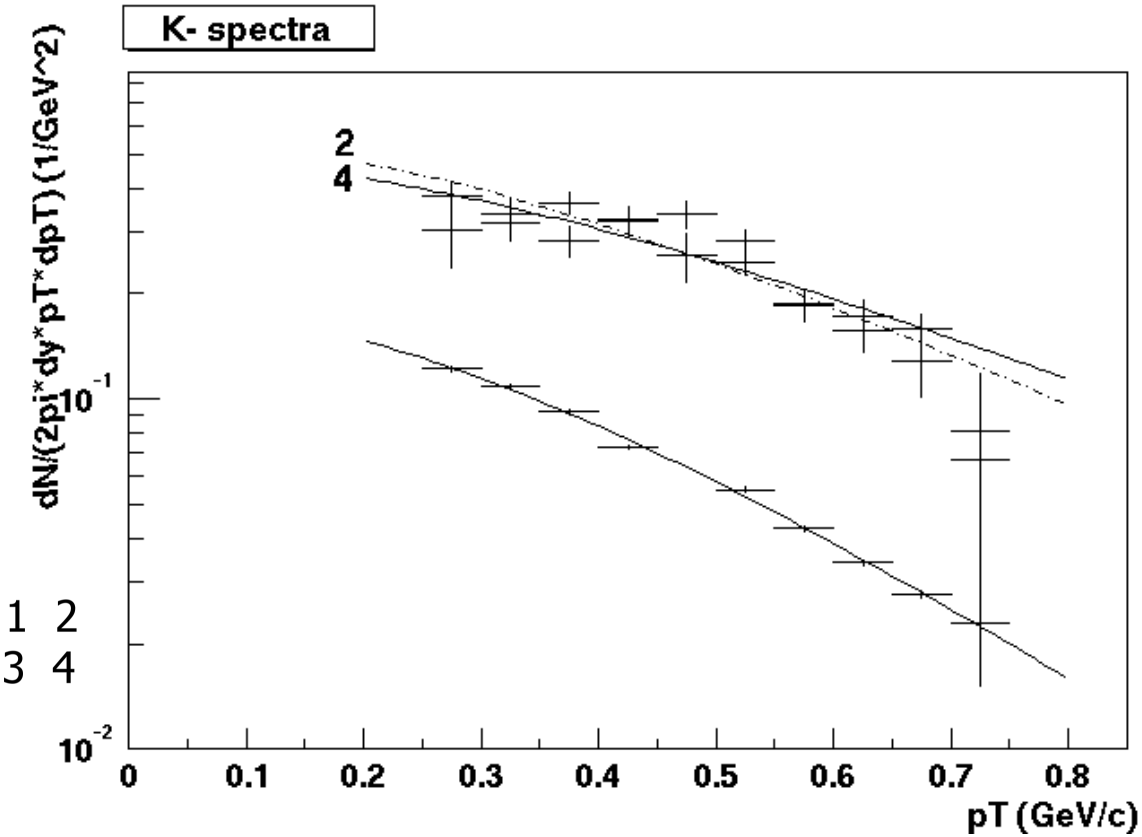
Pi- spectra



Regions: 1 2
3 4

Spectra is fitted to mT exp, not corrected for vertex finding efficiency and background events.

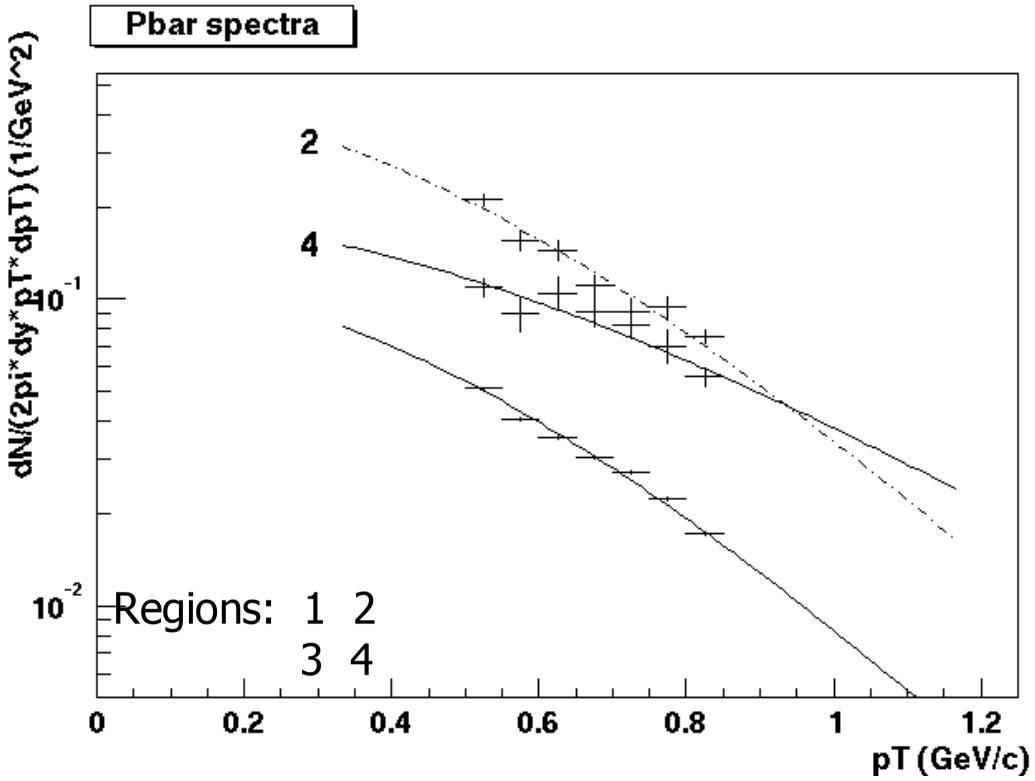
K- spectra

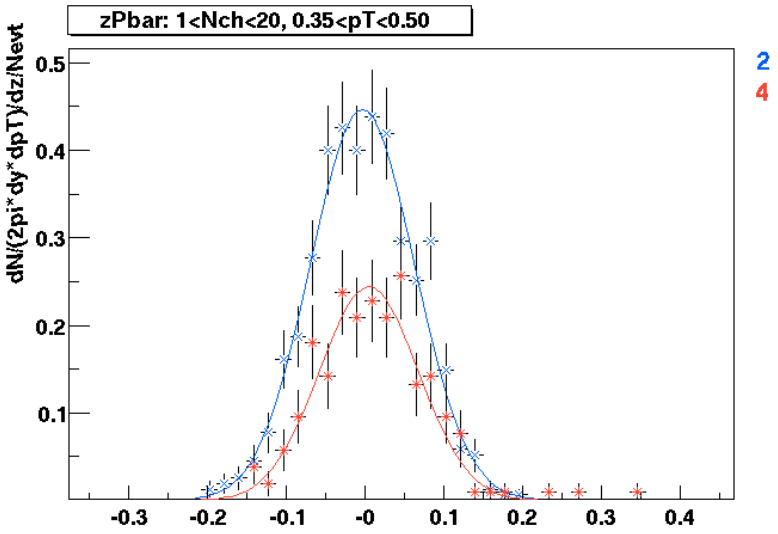


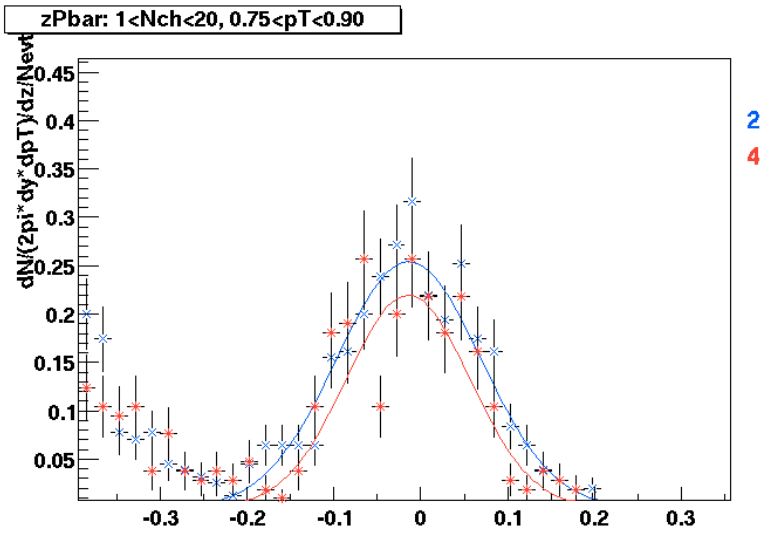
Regions: 1 2
3 4

Spectra is fitted to mT exp, not corrected for vertex finding efficiency and background events.

Pbar spectra







Spectra is fitted to mT exp, not corrected for vertex finding efficiency and background events.

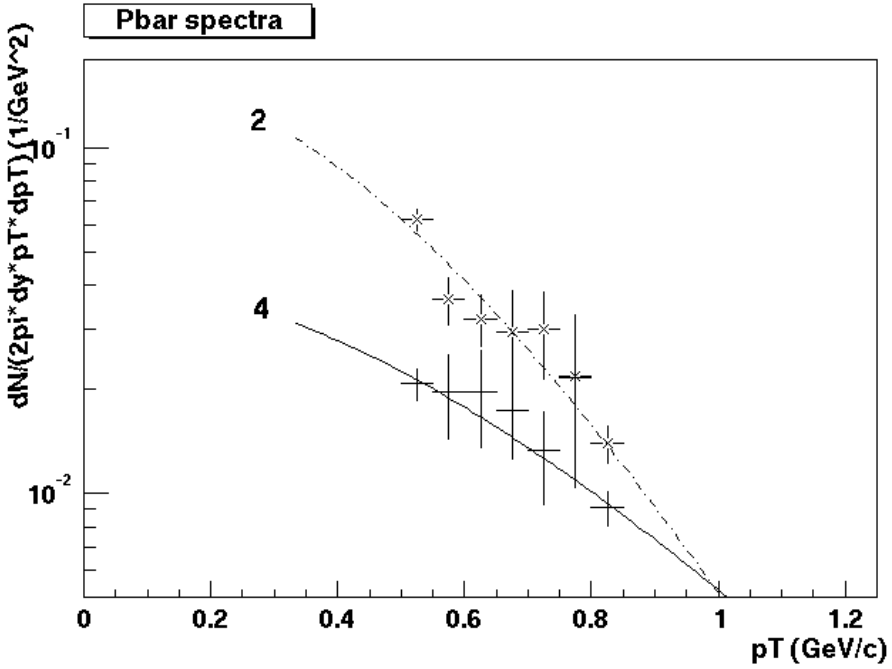
Numerical values

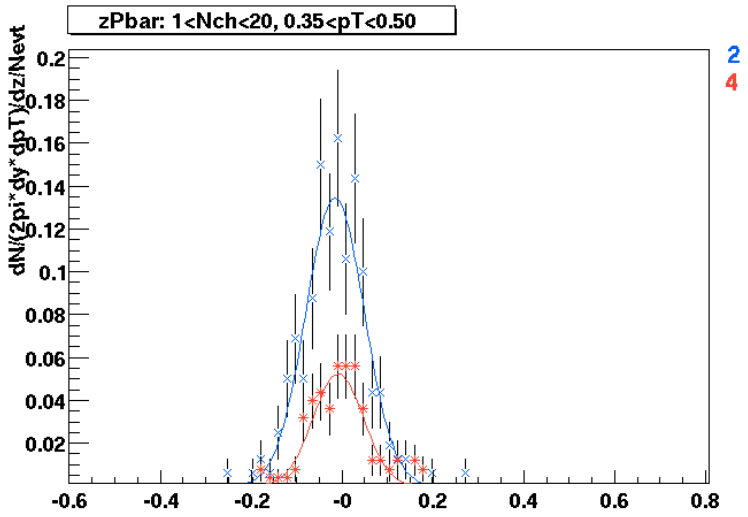
Pi-	T (GeV)	<pT> (GeV/c)	<pT> (E735)
2	0.161±0.001	0.36 ± 0.001	0.41
4	0.166±0.002	0.37 ± 0.0002	0.4
Ref.	0.163 ± 0.0001	0.36 ± 0.0001	0.38

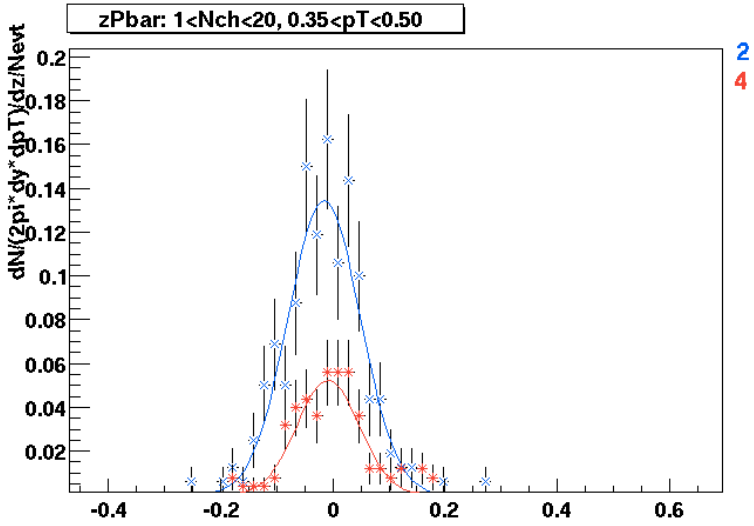
K-	T (GeV)	<pT> (GeV/c)	<pT>(E735)
2	0.256 ± 0.021	0.67 ± 0.003	0.62
4	0.309 ± 0.041	0.77 ± 0.011	0.6
Ref.	0.181 ± 0.003	0.53 ± 0.0001	0.5

Pbar	T (GeV)	<pT> (GeV/c)	<pT> (E735)
2	0.169 ± 0.009	0.63 ± 0.084	0.78
4	0.273 ± 0.025	0.86 ± 0.025	0.72
Ref.	0.169 ± 0.001	0.63 ± 0.001	0.62

Pbar spectra







T_2=0.123 ± 0.011 GeV <pT>=0.52 ± 0.006GeV/c
T_4=0.211 ± 0.037 GeV <pT>=0.72 ± 0.018GeV/c

Spectra is fitted to mT exp, not corrected for vertex finding efficiency and background events.

Summary, future plans

- CTB trigger enhances our high multiplicity data sample.
- The shape of the spectra changed.
- (However the <pT> agrees with previous experiments.)
- Work in progress……
- FTPC